

# TNR Appendix K

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## CATEGORIES OF TRANSPORTATION IMPROVEMENTS AND THE IMPROVEMENT EVALUATION PROCESS

Appendices K through O of the *Snohomish County Transportation Needs Report* (TNR) provide information about needed transportation improvements in unincorporated Snohomish County. For transportation improvements in each category the TNR provides:

**Informational Data** -- basic information about needed transportation improvements including location and type of project

**Descriptions of the Improvement Evaluation Process** -- descriptions of the different processes used to evaluate improvements for each of the categories of transportation projects

**Project Evaluations** -- evaluations showing the relative importance of different needed improvements within categories

### ***Planning and Programming Transportation Improvements***

The Snohomish County Department of Public Works programs transportation improvements for construction based on a multi-step planning process. The steps include the following:

1. The County develops its *GMA Comprehensive Plan* including the policy plan and the land-use element.
2. The *Transportation Element of the GMA Comprehensive Plan* identifies major road improvements needed to support the growth planned in the land-use element.
3. The *Transportation Needs Report* (TNR) provides basic information about and evaluation of the major road improvements identified in the *Transportation Element*. The TNR also includes information and evaluation for other categories of transportation improvements such as minor road improvements and bridges.
4. The improvement evaluation process evaluates needed transportation improvements for the categories of project types. Summaries of the improvement evaluation process are published in the TNR.
5. The overall planning process described above (Steps 1-4) provides information that management and staff use to develop the Snohomish County Six-Year Transportation Improvement Program (TIP).
6. The six-year TIP is used to develop the annual construction program (ACP).

# Categories of Transportation Improvements

Table 1 identifies and describes the categories of transportation improvements for which needs are identified and improvements evaluated.

<b>Table 1: Categories of Transportation Improvements</b>		
<b>Main Categories</b>	<b>Sub Categories</b>	<b>Descriptions</b>
Major Road Improvements	Major Widenings	major road widenings, primarily in response to level-of-service deficiencies on arterials, but also to improve traffic operations and/or upgrade roads to meet standards, primarily in response to safety issues
	New Alignments	major new alignments, primarily to accommodate planned growth consistent with the GMA Comprehensive Plan but also in response to level-of-service deficiencies in corridors
Minor Road Improvements	Spot Safety and Operations	spot improvement projects primarily in response to safety or operational issues
	Intersection Signals	intersection signal and roundabout projects in response to operational needs and warrant evaluations
	Guardrails	projects to install or improve guardrails where warranted
Non-Motorized Improvements	Pedestrian-Urban	urban pedestrian facilities consisting primarily of curbs and sidewalks to provide continuity of the pedestrian system relative to schools, transit stops, activity centers, etc
	Pedestrian-Rural	rural pedestrian facilities consisting primarily of widened shoulders or walkways to provide continuity of the pedestrian system relative to schools, transit stops, activity centers, etc
	Bicycle	on-road bicycle facilities consisting primarily of bicycle lanes in urban areas and widened shoulders in rural areas
	Off-Road	off- road, non-motorized facilities consisting primarily of pedestrian/bicycle trails
Other Categories	Bridges	rehabilitation or replacement of bridges
Drainage Improvements	Small Capital	projects to control and treat storm-water runoff associated with the transportation network
	Large Capital	same basic description as small-capital drainage
	DNR Projects	projects identified in the Drainage Needs Report associated with major road projects and non-motorized projects

# ***Improvement Evaluation Process***

The improvement evaluation process is a system to evaluate the relative importance of different needed transportation improvements within a given category. Methods of analysis and criteria (e.g., collision rates, traffic volumes, benefit-to-cost ratios, etc.) have been established for each of the categories of transportation improvements. For example, data on the number, types, dates, and locations of collisions are used to quantify collision rates and costs for individual county roads. These rates and costs can then be compared to evaluate the relative need for safety improvements among different roads.

The purpose of the improvement evaluation process is to provide information that management and staff use in developing the Snohomish County six-year transportation improvement program (TIP). For all categories of improvements, one outcome of the improvement evaluation process is the assignment of a high, medium, or low priority rating. Programming of improvements, however, is not based solely on these priority ratings. The improvement evaluation process is just one of the tools that management and staff use to make programming decisions.

## ***Features of the Improvement Evaluation Processes***

As stated above, different criteria and methods of analysis are used for the different categories of transportation improvements. However, they share certain common features discussed below.

- 1. Objective Criteria** -- Whenever possible, criteria used to evaluate improvements are based on measured, objective data. In cases where this is not possible, professional judgment is used. For example, traffic volumes can be measured, but estimating the extent to which a project adds to system continuity requires professional judgment.
- 2. Available Data** -- The evaluation process relies on data already being collected by Public Works for other purposes. This greatly reduces the amount of staff time necessary to support the process.
- 3. Sensitivity to Margins of Error** -- The comparison of improvements to determine their relative importance must be sensitive to margins of error in the data. It does not make sense to say that one improvement is more important than another on the basis of data in which the margin of error is greater than the difference in the data.
- 4. A Defensible Method of Screening** -- The evaluation process cannot consider all possible improvements. For each category a process is necessary to screen out improvements which are not needed in the foreseeable future so that a higher level of analysis can be conducted on the improvements which are more likely to be needed.
- 5. A Balance Between Technical, Institutional, and Funding Factors** -- The evaluation process is not a numerical data system used to automatically program transportation improvements. Programming decisions are made on the basis of many factors including technical analysis, institutional factors, and availability of funding. The evaluation process is simply a tool to help management and staff with the technical aspects of programming decisions.
- 6. Documented Process** -- The TNR documents both the process and the results of the evaluation process.
- 7. Open, Verifiable Process** -- The evaluation process should not be a "black box" into which data is added and "results" come out. As much as possible, the evaluation process is an open process with clearly identified criteria and methods of analysis. The evaluation process was developed with a teamwork approach with input and review from Public Works management and a technical team. Management provided overall process direction and review. The technical team works on an ongoing basis to coordinate the processes for the different categories and review the outputs to provide quality control.

# ***Descriptions of the Evaluation Process for Each Category of Improvement***

## **Major Road Improvements**

Major road improvements include widenings or new alignments for arterial sections that are typically several hundred feet to several miles long. In contrast, minor road improvements are typically limited to intersections or very short sections of roadway.

### ***Categories of Major Road Improvements***

The **major widenings** include major road widenings, primarily in response to level-of-service deficiencies on arterials. Consistent with requirements of the Growth Management Act (GMA), these improvements would insure that adequate capacity exists to keep the County's arterial system "concurrent" with the increases in traffic generated from new development. This category also includes major road projects to improve traffic operations (e.g., center turn lanes) and/or upgrade roads to meet standards, primarily in response to safety issues.

The **new alignments** are primarily to accommodate planned growth consistent with *the GMA Comprehensive Plan* but also in response to level-of-service or safety deficiencies in corridors.

### ***Criteria to Evaluate Major Road Improvements***

Public Works has established a set of criteria, which are shown in Table 2, to evaluate the major road improvements. The criteria fall into five broad categories:

**Safety And Operations** -- Criteria related to safety and operations including collision rates, collision costs, collision reduction benefit to cost ratio, and general operational conditions.

**Traffic Congestion** -- Criteria related to traffic congestion including current and forecasted traffic volumes, current and forecasted volume to capacity ratios, and current concurrency management status.

**Standards** -- Criteria related to the current physical conditions of the road as they relate to the Department's design standards including lane width, edge treatments, surface/structural condition, and alignment.

**Project Impacts** -- Criteria related to the estimated impacts of the project including cost effectiveness, environmental impacts, right-of-way needs, and coordination with other agencies.

**Growth Management** -- Criteria related to the transportation policies of the County's GMA Comprehensive Plan.

**Table 2: Criteria to Evaluate Major Road Improvements**

<b>Safety and Operations</b>	
Criteria	Measured As . . .
Collision Rate	number of traffic collisions per one million vehicle miles based on most current three years for which data is available
Annual Cost of Collisions	average annual cost of collisions based on most current three years for which data is available
Collision Reduction Benefit to Cost Ratio	project's estimated annual benefit in dollars (from reduced collisions) divided by estimated project cost
Existing Operational Condition	extent to which arterial operates safely and efficiently to provide access at cross streets and adjoining uses (professional judgment)
<b>Traffic Congestion</b>	
Criteria	Measured As . . .
Current Peak Hour Volume	PM peak-hour volume based on recent tube counts
Current Peak Hour Level Of Service (LOS)	comparison of current PM peak hour volume with the maximum service volume (i.e., capacity) of the specific arterial
Forecast Peak Hour Volume	forecast PM peak-hour volume from the County traffic model assuming improvements are constructed
Forecast Level of Service	comparison of forecast PM peak-hour volume with the current maximum service volume (i.e., capacity) of the specific arterial
Concurrency Status	relates to the County's four-tiered approach to monitoring level of service on arterials and how close the arterial is in failing the adopted standard
<b>Standards</b>	
Criteria	Measured As . . .
Existing Lane Width	average width of travel lanes measured in feet
Existing Edge Treatments	determination of whether or not the facility meets standards for edge treatments, either curb, gutter and sidewalk (urban areas) or 8-foot paved shoulders (rural areas)
Pavement Surface Condition	surface condition of the roadway determined by visual survey
Current Alignment	the extent to which the existing roadway meets standards for geometrics and sight distance (professional judgment)

<b>Project Impacts</b>	
Criteria	Measured As . . .
Project Cost Effectiveness	project benefit to cost, measured as the number of future annual vehicle miles traveled divided by the estimated cost in current dollars
Project Right-of-Way Needed	estimated additional right-of-way needed for the project measured in lateral feet
Number of Parcels	total number of parcels from which right-of-way would need to be acquired for the project
Parcel Density	total number of parcels from which right-of-way would need to be acquired divided by the length of the improvement
Wetland Density	average length of wetland adjacent to the identified improvement divided by the length of the improvement
Coordination / Collaboration	the extent to which other agencies are participating or are expected to participate in the project (professional judgment)
<b>Growth Management</b>	
Criteria	Measured As . . .
System Continuity	the extent to which the road project would fill important gaps in the County's overall arterial system (professional judgment)
Support Plans	the degree to which the project supports the GMA Comprehensive Plan, the Transportation Element, and/or other plans (professional judgment)
Existing Transit Use	the number of transit routes currently using the arterial
Non-Motorized Demand	the extent to which the arterial connects high-density residential and local activity centers (professional judgment)
Freight and Goods Movement	the extent to which the arterial supports freight and goods movement (professional judgment)
Economic Development	the extent to which the project maintains or improves the level of economic activity in the project's TSA (professional judgment)

### ***Evaluation and Scoring Process***

For each of the potential improvements, data is assembled for the criteria shown in Table 2. The raw data is converted to points (1, 2 or 3) according to specific rules based on one of the following two scoring systems:

1. For numerical criteria with objective measurements, the points are awarded based on a statistical comparison with the other identified improvement projects in the same category. The two main statistical measures used are the mean and standard deviation for the group (i.e., projects in same category). For example, assume that the criterion is current peak-hour volume and the category is Major Road Improvements – Major Widening. For each of the identified improvements, a current peak-hour volume is estimated using recent traffic counts. For this criterion, the higher the volume, the higher the presumed need for improvements; and thus the higher the score. Points are awarded as follows: one point if the current peak-hour volume is less than the mean minus one standard deviation, three points if the volume

is greater than the mean plus one standard deviation, and two points for volumes in between these two bounds (i.e., within the range of  $\pm 1$  standard deviation from the mean). If the standard deviation is larger than the mean, then it is factored to create a reasonable assignment of points.

2. For non-numerical criteria in which evaluation is made on the basis of professional judgment, the points are awarded on a simple three-point scale. For example, the GMA criterion “support plans” evaluates the “degree to which the project supports the GMA comprehensive plan, the Transportation Element, and/or other plans.” For this criterion, a “Low” level of support for plans is awarded one point, a “Medium” level is given two points, and a “High” level of support is awarded three points.

The project’s points are then averaged for each category of criteria. The average point score for each criteria category is then multiplied by its corresponding weighting, which is shown in Table 3 below. Then, the weighted point subtotals are added up to produce a raw score. Finally, the raw score is normalized by dividing by the maximum points possible (and multiplying by 1,000) resulting in a final score.

***Weightings for the Evaluation of Major Road Improvements***

As shown in Table 3, the five categories of criteria are weighted differently depending on the type of major road project. For major widenings, traffic congestion is weighted the most, safety/operations and growth management have intermediate weightings, and standards and project impacts are weighted the least. All of the categories are weighted equally for new alignments.

<b>Table 3: Weightings for Evaluation of Major Road Improvements</b>		
Category of Criteria	Major Widenings	New Alignments
1. Safety and Operations	2	2
2. Traffic Congestion	3	2
3. Standards	1	2
4. Project Impacts	1	2
5. Growth Management	2	2

***Screening for Major Widenings***

A process is needed for the major widenings to screen out improvements which are not needed in the foreseeable future so that a higher level of analysis can be conducted on the projects which are more likely to be needed. For this initial screening, major widenings are evaluated using only the first two criteria categories. Improvements which fall into the “low” rating based on this initial screening may not be carried forward into the full evaluation where all five criteria categories are used. The priority rating for “screened out” projects not carried forward into the full evaluation is shown as “Not rated” in TNR Appendix L.

***Priority Ratings***

The scoring results in a list of improvements which are ranked by final score from highest to lowest. This list is divided into three priority pools (high, medium, and low) based on the numerical ranking. Projects whose score is more than one standard deviation above the mean score are rated high, while those with a score more than one standard deviation below the mean are rated low. Projects in the middle (i.e., within the range of  $\pm 1$  standard deviation from the mean) are rated medium. See TNR Appendix N for priority pools by category.

# Minor Road Improvements

## *Description of Category*

Snohomish County Public Works supports an ongoing program of minor road projects to improve the safety and operating conditions of the road system.

The number and cost of minor improvement projects exceed the available dollars. To identify the most beneficial improvements, the County analyzes identified improvements through an evaluation process described below. Improvements with high priority ratings are examined in more detail to identify the availability of internal and external funding, the need for coordination with other improvements or agencies, and the availability of staff in other Public Works groups to conduct preliminary or design engineering. These efforts culminate with the identification of funded improvements in the County's annual construction program and their subsequent construction.

The scope of minor improvement projects falls between road maintenance activities and major road projects. These improvements entail a level of engineering, permitting, and coordination that requires them to be planned for in the budget and annual construction program. Improvements in this category that fall below certain cost thresholds may be constructed as day-labor projects by the County's Road Maintenance division rather than through a formal bid and contract process. This accelerates the time line and provides a quick response to identified needs.

In recognition of the importance of these minor road improvements in "filling the gap" between maintenance activities and major road projects, the County allocates to them each year a portion of its overall road fund revenues. In addition, there are several outside funding sources (e.g., RAP, WSDOT's safe route to schools program, HES) for these types of projects.

## *Categories of Minor Road Improvements*

There are three categories of minor projects evaluated for improvements:

**Intersection Signal and Roundabout Projects** respond primarily to traffic delay and operational needs. Locations are identified from traffic counts and analyzed using the warrants for traffic signals or roundabouts in the Manual of Uniform Traffic Control Devices (MUTCD).

**Spot Safety and Operational Improvements** correct identified needs in conformance to adopted standards. Spot safety improvements include, but are not limited to, removal of sight distance obstructions, removal of clear-zone barriers, illumination, minor roadway widening, or channelization improvements. Spot operational projects include, but are not limited to, improvements to turning radii, lane transitions, and intersection turn lanes. Note that these improvements may also be referred to as "TSIPs" which stands for "traffic safety improvement projects."

**Guardrail Projects** provide barriers in locations where obstructions are within the clear zone or to prevent vehicles leaving the roadway. Potential guardrail locations are analyzed following established professional guidelines for selecting, locating, and designing traffic barriers.

## *Identifying and Evaluating Minor Improvements*

The County identifies possible needs for minor road improvements through internal and external sources: internally, through data monitoring and staff observations, and externally, through requests from the general public. Potential improvements are investigated by the Traffic Operations section of Public Works. Some minor improvements are carried out by Traffic Operations. More expensive improvements are forwarded to the Program Planning

section. Identified improvements are added to the inventory of minor road projects as they are evaluated. The current lists of identified minor road improvements are included in the appendices of this report.

### *Types of Data and Evaluation*

The type of data used to evaluate the minor road improvements includes general information such as location and type of improvement as well as project specific information such as traffic volumes, collision experience, and road geometrics. Some data varies by type of project such as signal warrant and sight distance data.

The assembled data is used to evaluate the relative need for improvements through a scoring process (see Tables 4, 5, and 6).

**Table 4: Signal Program Criteria and Scoring**

A. Average Daily Traffic (ADT) $x < 3,000$ $3,000 \leq x < 6,000$ $6,000 \leq x < 9,000$ $9,000 \leq x < 12,000$ $12,000 \leq x < 15,000$ $x \geq 15,000$	points 1 2 3 4 5 6	Proposed locations are awarded points based on specific ADT ranges.
B. Collision Severity property damage only injury fatality	weighting 1 2 3	Total points equals sum of number of collisions by type (severity) multiplied by weighting for each type.
C. Number of Collisions $x < 5$ $5 \leq x < 10$ $x \geq 10$	points 1 2 3	As the number of collisions increases for a given location, the point values awarded increase.
D. Level of Service (LOS) LOS A LOS B LOS C LOS D LOS E LOS F	points 1 2 3 4 5 6	Point values increase directly as the LOS decreases (gets more congested).
E. Signal Warrants number of warrants met = number of points		Number of warrants met equals the point values awarded.

The points in each category are weighted then added together as follows for the total points:

$$(A)+(B)+(C)+(D)+(E) = \text{Sum of Categories}$$

**Table 5: TSIP Criteria and Scoring**

<p>A. Speed Limit in miles per hour</p> <p>20 25 30 35 40 45 50 55</p>	<p>points</p> <p>0 1 2 3 4 5 6 7</p>	<p>As the speed limit increases for a given location, the point values awarded increase.</p>
<p>B. Average Daily Traffic (ADT)</p> <p><math>x &lt; 400</math> <math>400 \leq x &lt; 2,000</math> <math>2,000 \leq x &lt; 4,000</math> <math>4,000 \leq x &lt; 6,000</math> <math>6,000 \leq x &lt; 8,000</math> <math>x \geq 8,000</math></p>	<p>points</p> <p>1 2 3 4 5 6</p>	<p>Proposed locations are awarded points based on specific ADT ranges.</p>
<p>C. Collision Severity</p> <p>property damage only injury fatality</p>	<p>weighting</p> <p>1 2 3</p>	<p>Total points equals sum of number of collisions by type (severity) multiplied by weighting for each type.</p>
<p>D. Number of collisions</p> <p><math>x &lt; 5</math> <math>5 \leq x &lt; 10</math> <math>x \geq 10</math></p>	<p>points</p> <p>1 2 3</p>	<p>As the number of collisions increases for a given location, the point values awarded increase.</p>
<p>E. Functional Class (FC)</p> <p>Local Access (Urban or Rural) Rural Minor Collector Urban Collector Rural Major Collector or Urban Minor Arterial Urban Principal Arterial</p>	<p>points</p> <p>1 2 3 4 5</p>	<p>Functional classifications yield different awarded points based on road locations and sizes.</p>
<p>F. Urban/Rural</p> <p>urban rural</p>	<p>points</p> <p>2 1</p>	<p>Roads lying within urban areas are weighted slightly higher than rural roads.</p>

The points in each category are weighted then added together as follows for the total points:

$$(A)+(B*2)+(C)+(D)+(E)+(F) = \text{Sum of Categories}$$

**Table 6: Guardrail Program Criteria and Scoring**

A. Speed limit (miles per hour) 20 25 30 35 40 45 50 55	points 0 1 2 3 4 5 6 7	Proposed locations with higher speed limits are awarded more points than roads with lower speeds.
B. Average Daily Traffic (ADT) x < 400 400 ≤ x < 1000 1000 ≤ x < 1500 1500 ≤ x < 2000 x ≥ 2000	points 1 2 3 4 5	Proposed locations are awarded points based on specific ADT ranges.
C. Collision Severity property damage only injury fatality	weighting 1 2 3	Total points equals sum of number of collisions by type (severity) multiplied by weighting for each type.
D. Clear Zone (feet) x > 10 7 < x ≤ 10 4 < x ≤ 7 2 < x ≤ 4 x ≤ 2	points 1 2 3 4 5	Distance measured from edge of traveled way to a roadside object.
E. Fall distance (feet) x < 6 6 ≤ x < 11 11 ≤ x < 16 16 ≤ x < 21 x ≥ 21	points 1 2 3 4 5	Vertical distance measured from edge of traveled way to the lowest point along critical area.
F. Water and/or Residence in clear zone none (N) water (W) residence (R) both (B)	points 0 5 5 10	For water depth that is greater than two feet deep and residences within the clear zone (danger area).
G. Fixed Object Size in clear zone Small Medium Large	points 1 3 5	Ratings related to fixed objects (poles, trees, utility/mail boxes, etc.) are based upon their break-away ability and location.

The points in each category are weighted then added together as follows for the total points:

$$(A)+(B*2)+(C*3)+(D)+(E)+(F)+(G) = \text{Total Points}$$

# Non-Motorized Improvements

*There are four categories of non-motorized improvements evaluated in the TNR.*

**Urban Pedestrian Facilities** consist primarily of sidewalks. In some cases walkways may also be used, generally as interim improvements.

**Rural Pedestrian Facilities** consist primarily of shoulders or walkways.

**Bicycle Facilities** consist primarily of bike lanes in the urban areas and shoulders in the rural areas. Bicycle facilities are constructed primarily on arterials, though in some cases they may be appropriate on non-arterial collector roads.

**Off-Road Non-Motorized Facilities** consist primarily of paved, multi-purpose trails and associated structures such as bicycle/pedestrian bridges and overpasses. This category also includes paved non-motorized connections (e.g., a connection between two road ends for non-motorized use only or a connection between a cul-de-sac and a non-motorized trail).

The following table shows the general types and categories of the non-motorized facilities evaluated in the Transportation Needs Report.

<b>Table 7: Categories of Non-Motorized Facilities</b>		
Type of Facility	Urban (Inside UGA)	Rural (Outside UGA)
Pedestrian Facilities	sidewalks	shoulders or walkways
Bicycle Facilities	bike lanes on arterials	shoulders on arterials
Off-Road Non-Motorized Facilities	multi-purpose paths and associated structures	

## *Pedestrian Facilities*

The County identifies potential improvements from requests by schools, citizens, other agencies, and Public Works staff. The need for specific facilities is determined and evaluated based on the adopted policies in the County's General Policy Plan. The list of needed pedestrian facilities (see Appendix N) is updated biennially to reflect changing conditions.

**Table 8: Pedestrian Program Criteria and Scoring**

A. Facility serves an urban center? yes no	points 1 0	Proposed locations that directly access urban centers or commercial areas are awarded one point.
B. Number of schools served by facility number of schools	0-5	Proposed locations within one-mile of a public or private elementary, middle or high school are awarded a point per school up to a maximum of 5 points.
C. Facility serves a transit route(s)? yes no	points 1 0	Proposed locations within ¼ mile of a Community Transit bus stop (including Park & Ride) are awarded one point.
D. Facility serves a recreational facility? yes no	points 1 0	Proposed locations that directly access a park, trail, lake or other recreational opportunities are awarded one point.
E. Adjacent street average daily traffic (ADT) x < 250 250 ≤ x < 1,500 1,500 ≤ x < 5,000 5,000 ≤ x < 10,000 x ≥ 10,000	points 1 2 3 4 5	Proposed locations are awarded points based on specific average daily traffic ranges up to a maximum of 5 points.
F. Number of pedestrian collisions (6-years) number of pedestrian collisions = number of points + 1 for a fatality	points  +1	Using official collision histories from the previous 6 years, proposed locations receive one point per pedestrian or bicycle collision. Another point is added if one or more was a fatality.
G. Facility provides connectivity? yes no	points 1 0	Proposed locations that further neighborhood connectivity and safety by joining existing pedestrian facilities receive a point.
H. Speed Limit of adjacent street x ≤ 20 20 < x ≤ 35 35 < x ≤ 45 x > 45	points 0 1 2 3	Proposed locations are awarded points based on specific ranges up to a maximum of 3 points.

The points for each category are added together for the total points as follows:

$$(A)+(B)+(C)+(D)+(E)+(F)+(G)+(H) = \text{Total Points}$$

## ***Bicycle and Non-Motorized Facilities***

### ***Bicycle Facilities***

This category of transportation improvements includes on-road bicycle lanes separated from vehicles by pavement markings (used primarily in the urban areas) and widened shoulders (used primarily in the rural areas or urban areas on low volume roads). Bicycle facilities will be on both sides of roads. They are typically needed on arterial roads, but in some cases are needed on local collector roads.

### ***Off-Road Non-Motorized Facilities***

This category of transportation improvements includes off-road, separated, multi-use paths for bicycles and pedestrians and associated structures like bridges, trail crossings and overpasses. Examples include the Centennial Trail, North Creek Trail, and improvements at various locations where trails cross public roads. Some of these facilities will be developed by the Snohomish County Parks Department and some will be developed by Snohomish County Public Works. Both the Parks and Public Works projects were evaluated and are included in this report.

### ***Description of Process for Bicycle and Off-Road Non-Motorized Facilities***

The identification of needed bicycle and off-road non-motorized improvements in the Transportation Needs Report (TNR) was originally conducted in conjunction with the development of Snohomish County's Paths for People Plan. Since that time updates to the TNR have been made to reflect completion of projects, annexations, changes to the Transportation Element, and other factors. The Paths for People planning effort began in 1993 to integrate non-motorized transportation into the County's overall transportation network. The objectives of the planning effort included the identification and evaluation of specific improvements that would meet the aims of and implement the non-motorized transportation policies. In 1996 a citizens' advisory group was formed to develop policies, identify non-motorized needs, and evaluate possible improvements. The plan was published in 1997.

### ***Criteria for Evaluation***

The criteria used to evaluate bicycle facilities and off-road non-motorized facilities for the Transportation Needs Report are shown below.

#### **Criteria to Evaluate Bicycle Facilities**

##### **1. Connectivity**

Scale of zero to 100 points based on total points. Points awarded for a connection to:

Commercial Area	10
Park	10
High Density Residential	10
Urban Center	15
Transit	15
School	20

Bonus Points for Multiple Connections:

No connection	0
1 connection	5
2 connections	10
3 connections	15
4 connections	20
5 or more connections	30

Bonus Points for Closing Gap: 15

**2. Existing Conditions**

Scale of zero to 100 points based on the degree to which the road currently lacks existing shoulders, sidewalks, or walkways.

**3. Collision History**

Scale of zero to 100 points based on average number of collisions per million vehicle miles with a higher rate resulting in more points.

**4. Average Daily Traffic (ADT)**

Scale of zero to 100 points based on average weekday, 24-hour traffic volumes with higher volumes resulting in more points.

**Criteria to Evaluate Off-Road Non-Motorized Facilities**

**1. Connectivity**

Scale of zero to 100 points based on total points. Points awarded for:

Connects Local Centers and/or Communities	15
Connects to an Employment/Retail Area	15
Connects to Recreation/ Public Facilities	15
Local Neighborhood Connection	15
Connects to an Existing Multi-Purpose Trail	20

Bonus Points for Multiple Connections:

No connection	0
1 connection	5
2 connections	10
3 connections	15
4 or more connections	20

**2. Crossing Issues**

Scale of zero to 100 points based on the following mutually-exclusive criteria:

No crossing issue	no points
At-grade trail crossing a street mid-block.	25 points
At-grade trail crossing an intersection.	50 points
Grade-separated trail crossing.	75 points

***Priority Ratings for Bicycle Facilities***

The points from all four criteria – connectivity, existing conditions, crash history, and ADT – are added together and the projects are then divided into three priority pools (high, medium, and low) based on their numerical ranking. (See Appendix N of the TNR for priority pools by category.)

***Priority Ratings for Non-Motorized Facilities***

The points from the two criteria, connectivity and crossing issues, are added together and the projects are divided into three priority pools (high, medium, and low) based on the numerical ranking. (See Appendix N of the TNR for priority pools by category.)

# Bridge Replacement and Rehabilitation

## *Bridge Inspection and Rating*

County bridges are inspected and rated at regular intervals in conformance with the National Bridge Inspection Standards. The purpose of this evaluation is to maintain safety and operating conditions on bridges by objectively monitoring current bridge conditions, identifying needed maintenance, and determining when preventive maintenance, rehabilitations or replacements are needed.

## *Bridge Sufficiency Rating*

Various elements of each bridge are assigned condition codes or appraisal codes. The various codes, traffic counts, deck geometry, load rating and detour length are combined in a sufficiency rating formula. The sufficiency ratings range from 0 (worst) to 100 (best).

## *Structurally Deficient (SD) Rating*

If the overall condition of the deck, substructure and/or superstructure is poor, the load-carrying capacity is low, or the waterway adequacy is very substandard, the bridge is classified as structurally deficient (SD).

## *Functionally Obsolete (FO) Rating*

There are many ways a bridge could be classified as functionally obsolete (FO). For example, if the bridge width is substantially less than the approach roadway, too narrow for the volume of traffic or has poor sight distance, the bridge may be classified as functionally obsolete (FO). Other causes include low underclearance, low load-carrying capacity, and substandard waterway adequacy.

## *Assigning Priorities for Bridge Projects*

Bridges are initially screened by sufficiency ratings and SD or FO classification.

First (highest) priority bridges for replacement or rehabilitation are those that;

- 1) have a sufficiency rating of 30 or less, and 2) are also structurally deficient.

Second priority bridges for replacement or rehabilitation are those that;

- 1) have a sufficiency rating between 30 and 50, and 2) are also structurally deficient.

Third priority bridges for rehabilitation are those that;

- 1) have a sufficiency rating of 50 or less, and 2) are also functionally obsolete.

After the initial screening, bridges may be moved to a higher or lower priority based on the criteria in Table 9 shown below. The final list indicating the County's needed bridge projects and the priority rating for each is included in the Appendix of this report.

<b>Table 9 -- Other Criteria Used in Modifying Bridge Improvement Priorities</b>	
Criteria	Change in Priority (Higher/Lower)
Bridge is easily maintained by county staff.	lower
A convenient detour is available.	lower
No detour is available.	higher
Bridge can be combined with adjacent funded project.	higher
Bridge is on a road that is essential to the movement of freight & goods.	higher

***Highway Bridge Replacement and Rehabilitation Programs (HBRRP)***

Since 1978 this federal program has provided 80% of the replacement cost for most of the bridges constructed in Snohomish County. To qualify, bridges must be greater than 20 feet long, have a sufficiency rating less than 30, and be structurally deficient. Several bridges on the County's current priority list do not meet these requirements, and for these bridges the County will need to look to other sources of funding. This program also can fund rehabilitation of bridges with sufficiency ratings less than 50 that are also structurally deficient or functionally obsolete. It is anticipated that for the majority of County bridges, the HBRRP will continue to be an excellent source of funding.

# Drainage Improvements

## *Description of Category*

Snohomish County Public Works has a program to identify, design and construct drainage improvements throughout the county. Projects may be undertaken individually or as part of larger road improvement projects. Funding may be provided by the Surface Water Management (SWM) division budget, the county road fund, grants or a combination of these sources. The road fund component depends on how much of the drainage problem is road-related.

## *Categories of Drainage Improvements*

Drainage projects included in this report are divided into the following categories:

**Large capital** projects are projects to control and treat stormwater runoff associated with the transportation network. They typically cost more than \$100,000. This category includes INF (Infrastructure), RSH (Rivers, Streams, and Habitat), and DNR (Drainage Needs Report) projects. DNR projects are drainage projects associated with major road projects or non-motorized projects that were identified in the 2002 Drainage Needs Report

**Small capital** projects are the same type of projects as large capital, but typically cost less than \$100,000. This category includes DRI (Drainage Rehabilitation and Investigation) and DNR projects.

## *Identifying and Evaluating Drainage Improvements*

The County identifies potential drainage projects from both internal and external sources. The DNR projects, of course, were identified in the Drainage Needs Report. Large capital projects, which are typically associated with road improvement projects or large-scale drainage problems, are usually identified by county staff during the course of their work or a project development process. Small capital projects, however, are developed from a variety of sources, including drainage complaints/investigations generated by citizens, county staff or local agencies; recommendations from SWM plans or reports; or requirements imposed to obtain state or federal permits.

Once identified, a project is assigned to the appropriate department for development of the project scope, budget and schedule. Project design and construction take place in accordance with the schedule, which is tied to funding availability. The small cap projects are often completed in one year or less, while the large cap projects usually take longer because of more detailed design requirements and integration with a larger road reconstruction project.

<b>Table 10: Criteria to Evaluate Small Capital Drainage Improvements</b>		
Criteria		Scoring
<b>Section A. Projects Developed From Drainage Complaints/Investigations:</b>		
1. What is endangered by the drainage problem?	Property only Natural systems Buildings or roads Human safety	5 points 10 points 12 points 15 points
2. How often does the problem occur?	Once Every few years Every year Several times each year	0 points 3 points 7 points 11 points
3. To what extent will the project solve the problem (including the need for maintenance)?	No effect Some relief Much relief Complete relief	0 points 5 points 9 points 12 points
4. How many homes or businesses will be positively impacted by the project?	0 – 2 3 – 6 7 – 30 31 +	2 points 6 points 9 points 12 points
5. What impact will the project have on: * Scale: Significant negative impact to significant positive impact	The local drainage system? Fish habitat? Water quality?	-10 to +15 points * -10 to +10 points * -10 to +10 points *
<b>TOTAL:</b> 45 to 85 = High Priority 36 to 44 = Medium Priority 0 to 35 = Low Priority		
<b>Section B. Projects Developed From Plans, Reports or Permits:</b>		
Projects developed from plans or reports typically have a rating or priority assigned in the document. Projects in support of state or federal permit requirements are prioritized according to the importance of the permit.		